

REMARKS

In the present Amendment, Claims 2 and 3 have been amended to replace the recitation “metallocene type cation” with “metallocene cation.”

New claims 6-8 have been added. Support for Claim 6 is found, for example, in the originally filed specification in Examples 2 and 3 using Polymers B or C. Support for Claims 7 and 8 is found, for example, in the originally filed specification at paragraph [0044] and in the Examples.

Paragraphs [0038] and [0056] of the originally filed specification were also amended herein for the reasons discussed below.

No new matter has been added, and entry of the Amendment is respectfully requested. After entry of the Amendment, Claims 1-8 will be pending.

Objections to the Disclosure

(a) The Examiner suggests that at page 12, line 16, Applicants intended to refer to “ferrocenium” instead of “phelocenium.”

Paragraph [0038] has been amended herein for clarification purposes to recite “ferrocenium.” Withdrawal of the objection is respectfully requested.

(b) The Examiner points out that the first sentence of paragraph [0056] of the present specification states that “the cis-1,4-content and vinyl bond content of the resulting polymers A-D are within the ranges defined in the invention.” However, the polymer D has a cis-1,4-content and a vinyl bond content which fall outside of the present claims. Further, Table 3 employs polymer D in Comparative Example 1.

Accordingly, paragraph [0056] has been amended herein for clarification purposes to disclose that “the cis-1,4-content and vinyl bond content of the resulting polymers A-C are

within the ranges defined in the invention.” Reconsideration and withdrawal of the objection are respectfully requested.

Rejections under 35 U.S.C. § 112

Claims 2 and 3 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite.

The Examiner takes the position that it is allegedly unclear how the word “type” in the expression “metallocene type cation” is intended to affect the scope of the expression “metallocene cation.”

Without acquiescence in the merits of the rejection, to advance prosecution, Claims 2 and 3 have been amended herein for purposes of clarification to recite a “metallocene cation.”

Reconsideration and withdrawal of the Section 112 rejection of Claims 2 and 3 are respectfully requested.

Nonstatutory Obviousness-type Double Patenting

Claims 1-5 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claim 16 of copending Application No. 10/562,157.

Without conceding to the merits of the rejection, Applicants choose to defer their response at this time, since the rejection is provisional.

Rejections Under 35 U.S.C. § 103

(a) Claims 1-5 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,429,089 (“Pedretti”) in view of U.S. Patent No. 6,046,266 (“Sandstrom”) and the evidence provided by U.S. Patent No. 5,428,119 (“Knauf”).

Applicants traverse and respectfully request the Examiner to reconsider in view of the following arguments.

Pedretti teaches a polybutadiene having a high cis-1,4 bond content that has stress-induced crystallization and is preferable for use in a pneumatic tire. Further, Pedretti generically discloses that a polybutadiene having a cis-1,4 bond content of higher than 99% can be attained. See col. 5, lines 20-23. However, Pedretti does not disclose an example producing such a polybutadiene. The polybutadiene produced in all of the examples in Pedretti have a cis-1,4 bond content less than 99.0%. Therefore, Pedretti does not place a person of ordinary skill in the art in possession of a polybutadiene having a cis-1,4 bond content of higher than 99%. Furthermore, while the polybutadienes produced in Examples 39-40 of Pedretti have a vinyl bond content of 0.2%, Pedretti is completely silent with respect to the desirability of a polybutadiene having a low vinyl bond content and the advantages obtained by employing such a polybutadiene in a pneumatic tire.

Sandstrom teaches the use of a polybutadiene having a high cis-1,4 bond content in the sidewall and tread members of a tire, but does not disclose a specified value of the cis-1,4 bond content in the polybutadiene. In claim 1, Sandstrom recites a rubber composition comprising 40 to 80 phr of trans 1,4-polybutadiene rubber and cis 1,4-polybutadiene rubber, wherein a weight ratio of trans 1,4-polybutadiene rubber to cis 1,4-polybutadiene rubber is within a range of 3/1 to 1/3. Because Sandstrom teaches a combination of trans 1,4-polybutadiene rubber and cis 1,4-polybutadiene rubber, a person of ordinary skill in the art would understand that trans 1,4-polybutadiene rubber is an essential component in Sandstrom.

Knauf analyzes a polybutadiene by means of FT-IR, but does not teach the use of polybutadiene in a tire. Further, Knauf does not disclose a polybutadiene having a cis-1,4 bond content of not less than 99.0% and a vinyl bond content of not more than 0.3%.

As mentioned above, the polybutadienes produced in the examples of Pedretti have a vinyl bond content of 0.2% but have a cis-1,4 bond content less than 99.0%. Therefore, the polybutadienes disclosed by Pedretti are clearly different from the polybutadienes used in the pneumatic tire according to the presently claimed invention. Further, Sandstrom does not teach the specified value of the cis-1,4 bond content in the polybutadiene.

The inventors of the present application discovered that a polybutadiene having both (1) a cis-1,4 bond content of not less than 99.0% and (2) a vinyl bond content of not more than 0.3% as measured by FT-IR has a considerably high extension crystallinity and, in addition, the wear resistance and the resistance to crack growth of the tire can be improved by using a rubber composition comprising such a polybutadiene. See paragraphs [0008] and [0015] of the present application.

In contrast, Pedretti, Sandstrom and Knauf do not disclose the use of a polybutadiene having a cis-1,4 bond content of not less than 99.0% and a vinyl bond content of not more than 0.3% as measured by FT-IR in a tire. Therefore, a person of ordinary skill in the art would not have expected the superior results of the presently claimed invention and would have had no reason to arrive at the presently claimed invention from the disclosures of Pedretti, Sandstrom and Knauf.

Indeed, an example using a polybutadiene with a cis-1,4 bond content less than 99.0%, as is described in the examples of Pedretti, corresponds to the Comparative Examples of the present application. The Comparative Examples have inferior wear resistance and inferior

resistance to crack growth. A person of ordinary skill in the art would understand from these results that the presently claimed invention cannot be made from a combination of Pedretti and Sandstrom.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the Section 103 rejection of Claims 1-5 based on Pedretti, Sandstrom and Knauf.

(b) Claims 1-5 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2005/0233894 ("Kaita") in view of Sandstrom.

Applicants traverse and respectfully request the Examiner to reconsider in view of the following remarks.

Kaita discloses a polybutadiene having a cis-1,4 bond content of not less than 99.0%, but does not disclose a vinyl bond content of the polybutadiene. In addition, Kaita does not teach the use of the polybutadiene in a tire.

As is demonstrated by a comparison of the Examples and Comparative Examples of the present application, if the polybutadiene does not have a cis-1,4 bond content of not less than 99.0% or a vinyl bond content of not more than 0.3% as measured by FT-IR, the wear resistance cannot be improved and cut growth cannot be suppressed. Therefore, even if Kaita is combined with Sandstrom, a person of ordinary skill in the art would not have expected the superior results obtained by the presently claimed invention, which would rebut any *prima facie* case of obvious that could be established by the Examiner.

In this regard, the vinyl bond has a greater effect on inhibiting extension crystallinity as compared with the trans bond. Applicants submit herewith the Declaration under 37

C.F.R. § 1.132 of Ms. Junko Matsushita in support of this position and in support of the patentability of the present claims.

Specifically, Ms. Matsushita prepared polybutadienes to evaluate the effect on inhibiting extension crystallinity due to a vinyl bond and a trans-1,4 bond.

In Comparison 1, a decrease in vinyl bond content of 0.23 had a corresponding improvement in resistance to crack growth of an index of 6. The larger the index value, the shorter the length of the cut grown and the better the resistance to crack growth. In Comparison 2, a decrease in vinyl bond content of 0.12 had a corresponding improvement in resistance to crack growth of an index of 3. In Ms. Matsushita's opinion, these results demonstrate that the extension crystallinity improves as the vinyl bond content decreases.

On the other hand, Ms. Matsushita also points out that the increase in the trans-1,4 bond content in Comparison 1 was greater than in Comparison 2, but the corresponding improvement in resistance to crack growth in Comparison 1 was greater than in Comparison 2.

Accordingly, it is Ms. Matsushita's opinion that these results demonstrate that the trans-1,4 bond content has a relatively smaller adverse effect on the extension crystallinity as compared with the vinyl bond content. Further, for the reasons discussed above, these results would have been unexpected to a person of ordinary skill in the art in possession of the disclosures of the cited art.

In view of the above, Applicants respectfully request reconsideration and withdrawal of the Section 103 rejection of Claims 1-5 based on Kaita and Sandstrom.

(c) New Claims 6-8 are patentable *at least* by virtue of their dependency on Claim 1 for the reasons discussed above and the additional independent elements recited therein.

For example, in the pneumatic tires recited by Claims 7 and 8, the rubber component of the rubber composition does not contain trans 1,4-polybutadiene rubber. In contrast, a person of ordinary skill in the art would understand that trans 1,4-polybutadiene rubber is an essential component of Sandstrom. A person of ordinary skill in the art would understand that the presently claimed invention according to Claims 7 and 8 cannot be made from a combination of Sandstrom and the other cited art.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.


Respectfully submitted,

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